until within a comparatively recent period. All the early chronicles abound in allusions to them—Remesal. Vasquez, Cogolludo, Villagutierre, Juarrez, and others. Uxmal and Chichen Itza, which Captain Brine speaks of as "discoveries," were undoubtedly occupied places at the time Grijalva touched the shores of Yucatan. Copan, although then a ruin, was visited and minutely described by Dr. Palacios as long ago as 1576. Captain Brine would lead us to infer that these remains have been "discovered" since the expedition of Del Rio to Palenque in 1787.

That these Ruined Cities were built by the progenitors of the various families of the Tzeudal or Maya stock found in Central America at the time of the discovery, and who are still there, and that many of them were then occupied and flourishing does, not admit of doubt—is capable of demonstration.

Big-eyed Wonder should be eliminated from modern speculation! E. Geo. Squier

New York, Sept. 14

The Dinnington Boulder

I have been favoured with a letter from a geologist residing at Newcastle-upon-Tyne, who kindly informs me that he has inspected the "fossiliferous boulder," and pronounces it to be a block of carboniferous limestone.

This gentleman, from his knowledge of the district, says, that this limestone (underlying the coal measures) crops out about seven or eight miles to the west or north west of Dinnington, from whence probably it came. The question asked of its direction of travel is therefore satisfactorily answered.

J. Brough Pow

Barbourne, Worcester, Sept. 21

Mechanical Drawing

In the opening address of the President of the Mechanical Section of the British Association, descriptive geometry and geometrical projection are both spoken of as subjects of little value to the mechanical draughtsman.

Now, being interested in the matter, I would like to ask the nature of that special kind of mechanical drawing of which the President spoke, and which leads to mensuration and geometry. I suppose from the address, descriptive geometry and geometrical projection will be dispensed with, seeing, as he says, that it is no loss to the mechanical draughtsman to be ignorant of the latter. As an illustration of that *real* mechanical drawing which he advocates, would Prof. Jenkin be kind enough to show the method he would adopt in the construction of a drawing which would show the lines of intersection of the surfaces of a cone and sphere whose axes are not in the same plane?

I can assure Prof. Jenkin that a word of advice from him will always be a great boon to the hardworking student.

Draughtsman

Fall River, Mass., Sept. 18

Ice-Fleas

I should have thought that the "ice-fleas" described by Prof. Frankland had been almost as familiar to Alpine travellers as their more offensive namesakes of the châlets. They are described by De Saussure (Voyages, § 2249), by Mr. Morell, "Scientific Guide to Switzerland," p. 275; by myself "Alpine Regions," p. 207, where references are given, chiefly to a paper by M. Nicolet in "Neue Denkschriften der Allg. Schweiz. Gesellsch." vol. v. (1841); and by other writers on the Alps.

T. G. Bonney

St. John's College, Cambridge

Thermometer Observation

One very hot day last summer I exposed to the sun, in the same position, three thermometers; No. 1 was a new one mounted on box wood, No. 2 was similar, but very dirty from exposure to the weather; No. 3 is what is known as a bath thermometer, with a metal scale. In the shade they all agree to about 1°, but in the sun No. 2 rose about 8° above No 1, and No. 3 about the same above No. 2. Here we have a discrepancy of about 16°, caused no doubt by the different heat absorbing and radiating powers of the substances on which the thermometers were mounted. I think this may somewhat account for the various readings we see announced by different observers.

D. J. Stuart

THE USE AND ABUSE OF TESTS

The gradually increasing recognition of the claims of Science by the Government is cause for unmingled satisfaction to every one who is interested in the material and moral progress of the country. And now that the Government has set its hand to the work, it seems disposed to let no timorous counsels or half-measures prevail. The readiness with which the demands of astronomers have been met last year and this, the really admirable practical instruction recently given to science teachers at South Kensington, are evidence of the earnestness of the intentions of those in authority.

In the present attitude of the Government towards Science, however, everything is not yet as it should be. Much of the practical value of this earnestness consists in the manner in which details are carried out, and there is one department of the administration in which a spirit of mischief appears to delight in neutralising all efforts at improvement. The recent movement to compel all candidates for employment under Government to submit themselves to an educational test is in the main a good one; but it may be carried to an excessive, even to a ludicrous, extent. Tests are in themselves valueless, unless they are so contrived as to test the possession by the candidate of those qualifications which will best fit him for the office he aspires to fill.

There are at the present time vacancies in one of our Government scientific establishments for two junior assistants, and the principal of the establishment was desirous of appointing two young men who possessed the needful qualifications of neat and orderly habits, punctuality, and obliging demeanour, and a love of Science for its own sake. The establishment in question has, however, the misfortune to be under the control of the Board of Works; and when the authorities of this department heard of the vacancies, they insisted, notwithstanding the remonstrances of those most interested, in announcing them for public competition. The consequence will be that the posts will, in all probability, be given to those who display the best acquaintance with English History or French, but who have not proved themselves possessed of a single qualification for these particular posts. This Procrustean system of measuring all men by the same standard will not answer. The inevitable result will be to fill all the square holes with round men, and all the round holes with square men. As reasonably might we require all the clerks in the Foreign Office to be acquainted with the properties of the chemical elements, or every assistant in the library of the British Museum to be able to name the bones in the human skeleton; for these are as essential to the liberal education which every gentleman ought to possess, as a knowledge of English History or French. The system pursued in the British Museum, which is fortunately under the control of another department of the administration, would satisfy all reasonable requirements: that the principals of all establishments should have the right to nominate candidates to vacancies, subject to a qualification-test of their general acquirements. It is but fair that in departments where the efficiency of the subordinate officials depends so much on their willingness to co-operate heartily with their superiors, and on the possession of qualities which no examination can possibly test, the principals should have some voice in the appointment of those who may probably succeed to the offices they themselves occupy. An opportunity is thus also given for the encouragement of young scientific aspirants, who may be known as earnest and careful workers, but who would otherwise stand little chance of Government employ.

We make these strictures in no carping spirit, but simply with a desire that the good work now commenced may not be marred by errors of administration. The only object of the system of competitive examinations, and of compelling all candidates for Government posts first to submit

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themselves to a qualification test, is in order that these offices may not be the refuge for genteel incompetence, but may be bestowed on the most fitting aspirant. We fear the above facts will show that the present system is not calculated in all cases to secure this end.

THE GIBRALTAR CURRENT

MR. CROLL having stated (NATURE, August 17) that, taking my own data, and having "in regard to the Gibraltar current and Dr. C.'s general oceanic circulation, determined the absolute amount of those effects on which his circulation depends," he has satisfied himself by mathematical investigation "that the work of the resistances greatly exceeds the work of gravity, and that consequently there can be no such circulation as that for which Dr. C. contends,"—I think it well to point out that the question of the existence of such a circulation is not to be disposed of by the calculations of even such an expert computer as Mr. Croll, but must be decided by the collection and comparison of facts ascertained by observation and experiment.

Now, as it happens that an opportunity has been recently afforded me by the Hydrographer to the Admiralty of carrying out, in conjunction with Captain Nares, of H.M.S. *Shearwater*, a series of further researches on the Gibraltar current, which place beyond all doubt the outflow of dense Mediterranean water into the Atlantic, over the "ridge" or "marine watershed" between Capes Trafalgar and Spartel, and beneath the surface-inflow of Atlantic water, I would submit (1) whether there must not be some fundamental fallacy in Mr. Croll's computations in regard to the Gibraltar current, and (2) whether this fallacy should not destroy all confidence in the infallibility with which Mr. Croll credits himself in regard to the general oceanic circulation.

No one can be more ready than myself to admit that this last doctrine is at present only a hypothesis, resting on a very narrow basis of fact. But as this hypothesis has been accepted as probable by such great masters in physical science as Sir John Herschel and Sir William Thomson, and as the means of putting it to the test will be supplied by the Scientific Circumnavigation Expedition, which (I have every reason to expect) will be fitted out by Her Majesty's Government next year, I would venture to suggest whether prudence does not dictate to the opponents of that doctrine, that they should either drop further discussion of it for the present, or that at any rate they should refrain from attempting to demonstrate its impossibility.

The number of NATURE which contained Mr. Croll's letter, having also given an account of the discussion which took place in the Physical Section of the British Association on a communication I made to it with reference to this subject, I may mention that my especial purpose in that communication was to obtain the judgment of the able physicists there assembled, as to a fundamental question at issue between my friend, Prof. Wyville Thomson, and myself, namely, the *cause* of that flow of polar water over the deepest parts of the ocean bottom, bringing down its temperature even under the equator to 33°·5, as to the fact of which we are in entire agreement. By my excellent colleague it is considered* that this flow is due to an indraught of polar water, occasioned by the surface efflux of equatorial water resulting from the action of the Trade Winds. To myself (not professing more than an elementary knowledge of physics) it seemed probable, on the principle of "least action," that the surface-water so removed would be replaced by an inflow from some other part of the oceanic surface, that is, by a horizontal circulation, rather than by an uprising of the whole subjacent mass, so as to draw in polar water at the bottom, and I have pointed out that such a surface-replacement is known to take place in the case of the Gulf Stream, one portion of which directly returns into the equatorial current, completing the shorter circulation, whilst the other has its complement in the Greenland, Labrador, and other polar surface-currents, of which the principal is traceable southwards nearly as far as the exit of the Gulf Stream from the Narrows, thus completing the longer circulation.

The correctness of this "common-sense" judgment was most emphatically affirmed, on the basis of profound physical knowledge, by Sir William Thomson and Prof. Stokes. It was agreed by these high authorities that in the open ocean the action of wind on the surface can never produce any other than a surface movement; the water propelled onwards from one part of the oceanic area being replaced by a surface inflow from other parts It is, therefore, for my opponents to explain how, otherwise than by gravity, it happens that polar water finds itself at the depth of 2,000 fathoms under the equator. That the bottom-temperature of the equatorial area, if there were no movement of polar water towards the equator, would be at least 20° higher than it is, may be asserted without the least hesitation; the temperature of the Mediterranean, which is cut off from communication with the lower stratum of the Atlantic, being 54° at corresponding depths.

It was agreed by Sir William Thomson and Prof. Stokes, that when a wind blows continuously into a loch or fiord, so as to produce a rise of water at its head to the amount of 6, 8, or 10 feet, such an excess of vertical pressure produces an outward under-current; the evidence of such outflow being afforded by the continuance of the surface in-current at the rate of three or four miles per hour, without any further increase in the rise of water at the head of the loch. This exceptional case was advanced by Sir W. Thomson as strongly confirming my general principle, not as invalidating it; and I would therefore recommend Mr. Croll to test his method of investigation by this ascertained fact, rather than spend his time in demonstrating the impossibility of what he may hereafter have to admit as no less certainly proved.

WILLIAM B. CARPENTER

H.M.S. *Shearwater*, Malta,
Sept. 20

SCIENCE IN ITALY

IN NATURE for June 8, I sketched a short notice of some of the Italian scientific serials, among them the *Annali di Chimica Applicata alla Medicina*, published at Milan. With the commencement of the present year the *Gazetta Chimica Italiana* has been launched at Palermo. The project of this publication originated in Florence with a society of Italian chemists, who met there in October last, and resolved to entrust the first year's "direction" of the magazine to Prof. Stanilaus Cannizzaro of the University of Palermo.

The Italian Chemical Gazette very nearly resembles the *Journal of the Chemical Society of London*. Like this it contains, first, original memoirs; second, translations or abstracts of the most important foreign chemical memoirs; third, a review of technological chemistry, agricultural chemistry, and crystallography; fourth, a summary of the principal chemical journals of Germany, England, and France; fifth, miscellaneous notes that may be interesting to those who cultivate chemical science. It is published monthly.

The most prominent, the longest, and most interesting of the original papers is by Prof. Cannizzaro: "Historical notes and reflections on the Application of the Atomic Theory to Chemistry, and on the Systems of Formulæ for expressing the Constitution of Compounds." This paper is continued in the number for January, April, and May,

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* See his Address on "The Distribution of Temperature in the North Atlantic," NATURE, July 27.

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